

DEPARTMENT OF CHEMISTRY

Common Course Outline

CHEM 272 – Bioanalytical Laboratory

Course Description

Develop and practice analytical laboratory techniques used in advanced chemistry and biochemistry. Experiments will include statistics and error analysis, UV/vis spectroscopy, protein/DNA quantitation, chemical and biochemical kinetics, equilibrium, acids/bases/buffers, and oxidation/reduction. The course will also focus on computerized data processing techniques, data interpretation and critical analysis, technical writing, and formal presentations.

PREREQUISITE(S): *A grade of C or better in CHEM 203 or consent of department.*

Credits: 1 semester hour; *Four hours laboratory each week.*

Course scheduling

Section offered every Spring at the Rockville campus.

Broad Course Outcomes

Upon successful completion of this course, a student will be able to:

- Identify and apply appropriate laboratory techniques to solve advanced chemical and biochemical problems.
- Use analytical instrumentation to identify, characterize, quantitate, and analyze organic and biochemical samples.
- Use appropriate computer programs and statistical methods to analyze and interpret experimental data.

Specific Course Objectives

Upon successful completion of this course, a student will be able to:

- Identify chemical and biochemical problems that can be solved by laboratory experiments.
- Apply laboratory techniques and methods to solve chemical and biochemical problems.
- Use standard analytical chemical and biochemical techniques for measurement of samples.
- Identify and use computer methods for data processing and calculations.
- Use basic statistical methods to assist in analysis and interpretation of laboratory data.
- Use the scientific literature to support or enhance interpretation of experimental results.
- Write formal laboratory reports using appropriate APA and ACS literature citation styles.
- Describe the background, analysis, and results of one experiment in a formal oral presentation.
- Identify chemical and biochemical problems that can be solved by laboratory experiments.

Major Topics

Experimental error; statistical analysis; scientific literature; IR spectroscopy, ¹H NMR spectroscopy, HPLC, UV/Vis spectroscopy; thin-layer chromatography; titrations; Beer's Law; chemical and enzyme kinetics; DNA melting/annealing; Michaelis-Menten Kinetics; DNA; peptide sequencing; bioinformatics.

Course Requirements

Grading procedures will be determined by the individual faculty instructor of each section, but will include the following *minimum* criteria:

- Laboratory Safety Assessment
- Pre-laboratory assignments
- Post-laboratory assignments/reports
- Oral presentation
- Laboratory final examination

Attendance in laboratory is mandatory. Unexcused absence of three or more lab meetings will result in automatic failure.

Grading Policy

The following letter grade policy will be used to determine final course grade.

A 100 - 90% **B** 89 - 80% **C** 79 - 70% **D** 69 - 60% **F** < 60%

Required Course Materials

- Laboratory procedures available through Blackboard LMS course-site.
- Laboratory safety goggles
- Laboratory notebook

Example Laboratory Experiments (subject to change)

1. Safety in the Chemical Laboratory / Review of IR and ^1H NMR Spectroscopy
2. Experimental Error and Statistical Analysis
3. Oxidation and Reduction; Analytical Titrations of KMnO_4 and H_2O_2
4. Identification of a Dipetide Sequence through NMR Analysis
5. Thermodynamics of DNA Melting
6. Synthesis and Analysis of Duplex DNA Coordinated to Cisplatin
7. Chemical Kinetics and Michaelis-Menten Kinetics
8. Enzyme Kinetics: Horseradish Peroxidase and TMB
9. Introduction to Bioinformatics

MC Student Code of Conduct and Academic Honesty

Montgomery College Syllabus Information